

**Comparison Studies over the Pt, PtRu, PtNi, and PtRuNi Electrocatalysts on Multi-Walled Carbon Nanotubes**

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**ABSTRACT**

The high cost of Pt it is still an issue to overcome respect to the development of PEM fuel cells. The utilization of adequate supports for electrocatalysts is helping to decrease the Pt content, providing high contact area, as well as allowing a good active metal particles distribution, optimizing in consequence the metal utilization. This research work presents the study of a series of low Pt content electrocatalysts (Pt, PtRu, PtNi, and PtRuNi), supported over multi-walled carbon nanotubes (MWCNT). Two types of MWCNT as well as two synthesis methodologies were used to obtain the materials. The characterization was performed using scanning electron and transmission microscopies, energy-dispersive X-ray spectroscopy, and XRD. The results showed that the active metal particle sizes are smaller than 10 nm. The electrochemical performance was evaluated in a normal three electrode cell using a potentiostat/galvanostat. The electrocatalysts in general exhibit high electrochemical activity towards the hydrogen oxidation reaction, 30-60% higher than a commercial material evaluated at the same conditions. In addition some of the materials showed good activity for the methanol electro-oxidation reaction decreasing also the onset potential.

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